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INYARD, APRIL C	

ART UNIT	PAPER NUMBER
1794	

NOTIFICATION DATE	DELIVERY MODE
05/29/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ADIPFDD@bipc.com

Office Action Summary	Application No.	Applicant(s)	
	10/584,407	BROOKS, PAUL JOSEPH	
	Examiner	Art Unit	
	APRIL C. INYARD	1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 March 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4-11 and 14-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4-11 and 14-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☒ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This second non-final action is in response to Applicant's amendments filed on 03/12/2009.

Response to Amendment

1. **Claims 1, 4-11, and 14-20** are pending in the application, Claims 2-3 and 12-13 are cancelled.

2. Amendments to the claims, filed on 03/12/09, have been entered in the above-identified application.

Withdrawn Rejections

3. The Examiner notes that the foreign priority documents have not been received from the International Bureau, however, the examiner will attempt to obtain the documents.

4. The objection to Claim 1 is withdrawn in view of Applicant's amendments of the phrase "adapted to".

5. The rejection of Claims 1-4, 6 and 12-13 under 35 USC 112 second paragraph, are withdrawn as the cancellation of claims 2-3 and 12-13, and amendment of claim 1 to include the physical characteristic of having high and low refractive index layers renders these rejections moot.

Claim Rejections

6. **The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action**.

7. Claims 1, 4-11, and 14-20 have been considered as follows:

Claim Interpretation

8. Regarding the wavelengths in Claim 1 for the "far infrared" range of the instant claims, Applicant does not provide a definition of what is meant by this, but simply that the wavelength range of "2.5 to 50 micrometers" is considered to be "far infrared". The Examiner notes that this wavelength range is actually a subset of infrared wavelengths known as the standard range accepted to be defined as middle infrared, or mid-infrared (not far). Therefore, the Examiner interprets the instant claim toward "far infrared" to mean anything within the infrared wavelength range as defined.

9. Regarding the "polymeric structure" in Claim 6, the Examiner gives this the broadest reasonable interpretation in that the language is open language and not exclusive to other materials present in the multi-layer filter. Therefore, any prior art teaching that includes at least one polymeric layer in a multi-layer film is considered to read on "polymeric structure".

Claim Rejections - 35 USC § 112

10. **Claims 5 and 14-20 are rejected under 35 U.S.C. 112, second paragraph**, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 5 recites the limitation "wherein the film is in the form of a liquid coating to be applied to a surface."

a. There is insufficient antecedent basis for this limitation in the claim. The disclosure neither provides an example nor a technical description of a liquid composition that may be used as a thermal control film for a spacecraft.

b. It is unclear how the "film" of Claim 5, which has not yet been applied to the surface of a spacecraft, can exist both as a film and a liquid, particularly as a liquid with multiple polymeric layers. These inconsistencies therefore render Claim 5 vague and indefinite.

Claims 14-19 are indefinite because they depend from Claim 13, and **Claim 20** depends from Claim 3, both of which were cancelled by Applicant, therefore rendering Claims 14-20 indefinite. If the Examiner assumes Claims 14-20 depend from independent Claim 1, then Claims 14-20 would be substantial duplicates of claims 4 and 6-11. Therefore, Claims 14-20 have not been further considered.

Claim Rejections - 35 USC § 102

11. **Claims 1, 4, 6, and 9-11 are rejected under 35 U.S.C. 102(b) as being anticipated by Lepore et al. (US Patent No. 5,373,305) as evidenced by the *Encyclopædia Britannica* ("infrared radiation." Encyclopædia Britannica. 2008. Encyclopædia Britannica Online. 27 Oct. 2008 http://www.britannica.com/EBchecked/topic/287964/infrared-radiation) and *Merriam-Webster* ("metalloid." Merriam-Webster Online Dictionary. 2009. Merriam-Webster Online. 19 May 2009 http://www.merriam-webster.com/dictionary/metalloid).**

Regarding **Claim 1,** Lepore teaches a thermal control film for use in spacecraft comprising a multi-layer interference filter *('305, Col 2, at least two films, lines 37-38; Figs. 4 and 5).*

Lepore describes that the RF-transparent antenna thermal membrane (film) should "significantly attenuate passage of infrared, visible and ultraviolet (UV) components of sunlight" and "should be transparent to radio-frequency signals (RF), which includes signals in the range between 30 to 300 MHz and 26 to 40 GHz, inclusive" *('305, Col 1, lines 26-35).* Lepore discloses that the thermal control film is applied to a spacecraft antenna operating in the 12-14 GHz frequency band *(Col 7, lines 50-54)*, and thus is a film used on an active antenna and is transparent to frequencies in the microwave range.

Lepore discloses that the solar control film satisfies the following criteria: "ideal antenna sunshield membrane for use on communications spacecraft would exhibit all of the following characteristics: (1) Low RF loss; (2) Low solar absorbance (α); (3) High IR (infrared) emittance (ε); (4) Low transmittance (τ) of visible and infrared; (5) High tear strength; (6) Long term space stability--resistance to degradation caused by solar ultraviolet and ionizing radiation, thermal cycling, atomic oxygen; (7) Sufficient electrical conductivity for electrostatic discharge (ESD) protection" *('305, Col 3, lines 15-38).*

As evidenced by *Encyclopædia Britannica,* "far infrared" is defined as wavelengths in the range of 50 to 1000 micrometers, whereas wavelengths within the range of the instant claim, 2.5-50 micrometers, are defined as mid-infrared.

The multi-layered film that satisfies the above requirements as disclosed in Fig. 5 by Lepore *(Col 7, lines 1-38)* has black polyimide dielectric films (labeled elements 510, 520, and

530) bonded with glass fiber reinforcement mesh films between (labeled elements 514, 524, 534), quartz fiber mats (516, 518, 526, 528) to provide increased radiation isolation, and a single germanium coating layer (labeled element 512, on the space facing surface of film 510):

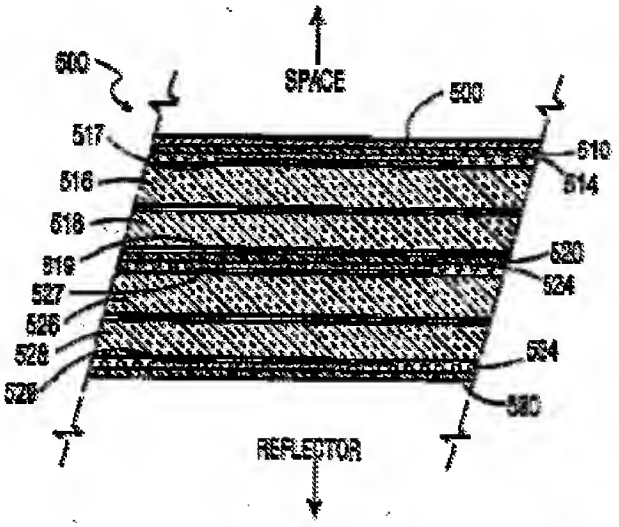

FIG. 5

Lepore teaches that black polyimide minimizes transmittance and RF transmission losses through the membrane *(Col 4, lines 58-66)*.

The polyimide dielectric films, glass and quartz fiber reinforcement multi-layer stack is considered to thus correspond to a multi-layered filter with alternating high and low refractive indices.

The Examiner takes the position that germanium, a known metalloid, is a nonmetal as evidenced by *Merriam-Webster*, where metalloids are intermediate in properties between metals and nonmetals, but are considered nonmetals that can combine with a metal to form an alloy. Therefore, the thermal control film taught by Lepore is considered to be metal free.

Thus, Lepore discloses a metal free thermal control film for use on an active spacecraft antenna comprising a multi-layer interference filter that exhibits preselected high absorbency and

emissive characteristics in the [far] infrared wavelength range, low absorbency characteristics in the solar spectrum range, and high transmissive characteristics in the microwave frequency and meets the limitations of **Claim 1**.

Regarding **Claim 4**, Lepore discloses that the film "material is flexible" *('305, Col 4, line 67)* as it is in the form of a "membrane or blanket" *('*305, w*hich the Examiner notes to be 'flexible', Col 5, line 66)*. Lepore further discloses that the thermal control film is applied to a spacecraft antenna wherein the "multilayer membrane is held together by stitching around its periphery with two stitch lines on its face" *('305, Col 7, lines 53-54)*. Thus Lepore teaches an active face of a spacecraft antenna covered by a thermal control film in the form of a flexible sheet.

Regarding **Claim 6**, as discussed above, Lepore teaches that the multi-layered film structure has polyimide layers. Therefore, Lepore discloses that the multi-layered filter has a polymeric structure.

Regarding **Claims 9-10**, Lepore teaches that the thermal control film comprises a germanium layer that can have a thickness of from about 150 to 900 angstroms (0.015 to 0.09 microns), and at least two dielectric layers between 0.0005 and 0.003 inches (13 to 76 microns), therefore a thermal control film with three layers as taught by Lepore has a thickness from about 26 to 150 microns *(Claims 1 and 9)*. Therefore, Lepore discloses that the control film has a thickness that is encompassed by Applicant's claimed thickness range and meets the limitations of the instant claims.

Regarding **Claim 11**, Lepore teaches that the control film is applied to a spacecraft antenna operating in the 12-14 GHz frequency band, and thus the active face of an antenna

carried by the spacecraft and likewise teaches an antenna comprising a thermal control film according to Claim 1 covering the active face thereof *('305, Figs. 1-2; Col 7, lines 50-54; Claim 16)*.

12. **Claims 1, 4, and 6-7 are rejected under 35 U.S.C. 102(b) as anticipated by Iacovangelo et al. (US Patent No. 6,587,263 B1).**

Regarding **Claim 1,** Iacovangelo teaches a radiative control film that may have a modulated refractive index profile to control the amplitude, bandwidth, and wavelength of rejection bands *('263, radiative layer 308, Fig. 3; Col 2, lines 41-50; Col 3, lines 7-14)* for use on spacecraft to minimize thermal absorption and thermal variations in sensitive electronic devices, where such films must not absorb in the solar spectrum but must absorb and emit from 2.5 to 25 microns *(Col 1, lines 10-36)*.

The radiative control film taught by Iacovangelo is a multi-layer interference filter "comprising SiO_2, SiO_xN_y and Si_3N_4 and has a low absorbency of electromagnetic radiation having wavelengths of approximately 200 nm to approximately 2500 nm [solar energy] and high absorbency and emissivity electromagnetic radiation having wavelengths of approximately 2.5 micrometers to approximately 25 micrometers" *('263, Abstract; Fig. 1; Claims 1-6 and 11)*.

The Examiner considers the radiative control film structure of Iacovangelo to correspond to Applicant's claimed thermal control film and notes that while this control film is deposited on a metal surface layer, that the radiative film itself is metal free.

Iacovangelo teaches that the film has low absorbency over the solar frequency range of 200-2500 nm, and high absorbency and emissive characteristics over the frequency range of 2.5-25 micrometers, which is encompassed by Applicant's claimed range.

The Examiner takes the position that the film taught by Iacovangelo is highly transmissive over the microwave frequency range because: (1) Iacovangelo teaches that such radiative films are used to cover and protect operating electronic equipment on spacecraft from overheating, and (2) Iacovangelo teaches a multi-layered film of polymeric structure that directly corresponds to Applicant's disclosed and claimed high and low refractive index materials in Claims 6-7.

Therefore, the Examiner deems that the radiative control film of Iacovangelo is transmissive to microwave frequencies.

Regarding Applicant's preamble statements reciting the purpose or intended use of the thermal control film on an active spacecraft antenna, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim *(see MPEP 2111.02)*.

In so much as Iacovangelo teaches use of the radiative film on operating electronic equipment on spacecraft, the Examiner takes the position that such equipment includes active antenna and/or such radiative films are capable of performing the intended use.

Thus, Iacovangelo discloses a metal free thermal control film that meets the Applicant's claimed limitations.

Regarding **Claims 4-5**, Iacovangelo discloses that the use of $SiO_2/SiO_xN_y/Si_3N_4$ materials for the thermal control film results in a reduction in breakage due to handling. Therefore, the Examiner takes the position that the multi-layered film taught by Iacovangelo is flexible.

The Examiner notes that **Claim 5**, as interpreted above, is a product-by-process claim that recites a film "formed by applying a liquid". The Examiner notes that the patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process", *In re Thorpe,* 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). Further, "although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product", *In re Marosi,* 710 F.2d 798, 802, 218, USPQ 289, 292 (Fed. Cir. 1983). See MPEP 2113.

Regardless, Iacovangelo discloses that the one or more layers of the modulated $SiO_2/SiO_xN_y/Si_3N_4$ coatings can be deposited using a plasma enhanced chemical vapor deposition process (PECVD) *(see Col 6)*. Therefore, the Examiner deems that the film taught by Iacovangelo when deposited with PECVD is a liquid and which then forms a flexible multi-layered sheet. Thus, Iacovangelo meets the limitations of instant **Claims 4-5**.

Regarding **Claims 6-7**, as discussed above, Iacovangelo discloses that the radiative film is a polymeric structure and comprises one or more layers of any combination of SiO_2, SiO_xN_y and Si_3N_4 *('263, all of Col 6, radiative layer includes one or more layers of modulated $SiO_2/SiO_xN_y/Si_3N_4$ coatings)*. Therefore, Iacovangelo teaches a control film that meets the limitations of **Claims 6-7**.

Claim Rejections - 35 USC § 102/103

13. **Claims 1 and dependent claims 4-11 are either rejected as being anticipated under 35 U.S.C. 102(b), 102(f) (see MPEP 2137) or obvious under 35 U.S.C. 103(a).**

The Examiner notes that Claim 1 and dependent claims 4-11 are directed toward the physical characteristics of a thermal control film for use in spacecraft. The disclosure neither provides a working example of a thermal control film with a multi-layer interference filter having these physical characteristics nor any technical teachings about specific materials and their structural relationships that can be used in each layer of the claimed thermal control film; they state that they are relying upon companies such as 3M to develop film having the claimed properties. This suggests that the claimed invention is merely a derived use and application of a disclosed prior art material, "3M Radiant Mirror Film VM 2002" (page 9, lines 5-6), rather than an invention of the claimed subject matter.

Alternatively, the Examiner takes the position that 3M makes films having the claimed properties or the only manipulation step that is occurring on the part of the Applicants is the selection of the wavelength ranges claimed. It is the Examiner's position that setting forth the ranges where one would want a film to function is within in the level of ordinary skill in the art. This would be directly related to the end use of the films and how one of ordinary skill in the art would want them to function. The Applicants have set forth the ordinary skill level of ordinary skill in the art with respect to manufacturing the films by stating that 3M has the skill to manufacture to spec. Thus, the question to be decided is to how non-obvious is the selection of optical ranges.

Claim Rejections - 35 USC § 103

14. **Claims 1, 4, 6, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over "3M Radiant Mirror Film VM 2000F1A6" (3M VM2000) in view of Lepore et al. (US Patent No. 5,373,305).**

Regarding **Claims 1, 4, 6, and 11**, the Applicant claims particular physical properties of a thermal control film with a multi-layer interference filter: high absorbency and emissive characteristics in the [far] infrared wavelength range, low absorbency characteristics in the solar spectrum range, and high transmissive characteristics in the microwave frequency.

The present specification clearly admits that it is within the ordinary skill in the art to produce films having those properties (page 8, lines 1-2 and lines 21-24). The Applicant additionally states that 3M produces films of this type (page 9, lines 5-6).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have optimized the films taught by 3M VM2000 for optimal thermal control because 3M VM2000 discloses that "3M Radiant Films can be die cut, sheer slit, coated to be UV and abrasion resistant, printed, and laminated to various substrates" and Lepore teaches optimization of physical properties of thermal control films *('305, Col 3, lines 15-28)* wherein the bandwidth frequencies for absorbency and emissivity meet Applicant's claimed limitations.

Furthermore, it would have been obvious to one having ordinary skill in the art at the time of the invention to adjust the physical properties of the 3M VM2000 film for the intended application, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

15. **Claims 7 and 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lepore et al. (US Patent No. 5,373,305) in view of Iacovangelo et al. (US Patent No. 6,587,263 B1).**

Regarding **Claim 7**, Lepore and Iacovangelo each teach a thermal control film that meets the limitations of Claim 1 as discussed above.

Lepore fails to specifically teach that the multi-layer interference filter comprises one or more layers of any combination of SiO_2, SiO_xN_y and Si_3N_4.

However, Iacovangelo teaches this multi-layer polymeric structure as it yields very good absorptivity and emissivity values *('263, Col 5, lines 24-25)*.

Lepore teaches the disclosed invention except for the use of SiO_2, SiO_xN_y and Si_3N_4 as one or more layers in the multi-layered interference filter of the thermal control film.

However, at the time of the invention, it would have been obvious to one having ordinary skill in the art to include the silicon-based compositions taught by Iacovangelo in the thermal control film taught by Lepore because use of modulated $SiO_2/SiO_xN_y/Si_3N_4$ layers yields very good absorptivity and emissivity values and will further enhance the protection of spacecraft antennae from overheating while simultaneously allowing transmission of radio-frequencies.

Regarding **Claims 9-10,** Lepore and Iacovangelo each teach a thermal control film that meets the limitations of Claim 1 as discussed above.

Lepore teaches that the thermal control film comprises a germanium layer that can have a thickness of from about 150 to 900 angstroms (0.015 to 0.09 microns), and at least two dielectric layers between 0.0005 and 0.003 inches (13 to 76 microns), therefore a thermal control film with three layers as taught by Lepore has a thickness from about 26 to 150 microns *(Claims 1 and 9)*

and the structure of the thermal control film may be multi-layered *(Figs. 5 and 6 and associated text)*.

Iacovangelo teaches that the standard thickness of thermal control films known in the art is 0.002", i.e. 51 microns *('263, Col 1, line 51)* and discloses a thickness of the thermal control film of about 10 to 25 microns *('263, Claim 1)*.

Lepore and Iacovangelo both teach that the thickness of the thermal control films is within the range of the instant claims. Given that the thickness of the thermal control films is known in the art to depend on optimization of the thermo-optical properties of the multi-layer *('263, Col 7, lines 9-14)*, it would have been obvious to one having ordinary skill in the art at the time of the invention to adjust the thickness of the thermal control film for the intended application, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

16. **Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lepore et al. (US Patent No. 5,373,305) in view of Iacovangelo et al. (US Patent No. 6,587,263 B1) and Fischell (US Patent No. 3,671,286).**

Lepore ('305) in view of Iacovangelo teaches the thermal control film of Claim 7 and 15 (see above).

Lepore ('305) does not specifically point out that the thermal control film is in the form of a plurality of tiles.

Iacovangelo ('263) does disclose that thermal control films for spacecraft are typically known to often be in the form of 3"x3"x0.002" tiles, and that a spacecraft requires a large number of such pieces *('263, Col 1, lines 51 and 62-64)*.

Furthermore, Fischell discloses a thermal control film for spacecraft with a low absorptivity to emissivity ratio that can be "bonded in the illustrated tile-like fashion to the exterior skin of the satellite" *('286, Col 3, lines 11-12; Fig. 1)*.

Lepore discloses the claimed invention except for that the thermal control film is in the form of a plurality of tiles. However, given that tiles are known in the art as taught by Iacovangelo and that Fischell discloses that tiles are an effective way to radiate heat which is generated within the spacecraft while at the same time reflecting virtually all of the incident solar radiation to which the spacecraft is subjected when in a space environment *('286, Col 3, lines 13-17)*, it would have been obvious to one having ordinary skill in the art at the time the invention was made to cut the membrane or blanket taught by Lepore into tile like shapes, since it has been held that the configuration was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration claimed was significant. *In re Dailey,* 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

Response to Arguments

17. Applicant's arguments filed 03/12/2009 have been fully considered but they are not persuasive.

18. **Regarding the rejection under 35 U.S.C. 102(f),** Applicant argues on pp. 6-10 that the claimed invention cannot be reasonably considered as being derived from the 3M Radiant Mirror Film VM 2002, and points to various citations of the present disclosure where Applicant discusses modifications that can be made to the commercially available 3M Films.

However, Applicant admits on the record on pp. 8-9 of the arguments that "the exemplary thermal film is based on a commercially available material [3M Radiant Mirror Film] which is then adapted to achieve the desired optical characteristics, and a customized material can be manufactured to the precise specifications and obtained from certain suppliers", where "the claimed invention lies in the identification and selection of desired characteristics of a thermal film to achieve a desired results. The 3M Radiant Mirror Film is an example of a known material that can be adapted to embody the characteristics necessary to achieve the desired result."

The Examiner wishes to make the following comment: The Applicants have no working examples and give no guidance as how one would manipulate the multilayer film structure to give the claimed properties, save to specify desirable bandwidth frequency ranges for the film, and have admitted that it is within ordinary skill in the art to adapt commercially available materials to meet such requirements. The applicants merely defer the skill to companies such as 3M, stating that they have the ability to manufacture films having different specifications.

At very most, the applicants set forth the properties of the films they want and have manufactured or in the very least they are relying upon a commercially available product. Given the lack of guidance in the specification, and the admission that companies such as 3M have the ability to manufacture films to particular specifications, the applicants are clearly relying upon

the ordinary skill in the art to produce their structures. The Examiner will rely upon that same level of skill in her rejection of the claims as what would be considered obvious and the types of manipulations would have been within the ordinary skill in the art at the time the invention was made. The Examiner wishes to forewarn the Applicants that any arguments directed against the ability of one having ordinary skill in the art to produce the claimed films may be used to support a future rejection of the claims as not being enabled. The Examiner should be able to rely upon the same skill in the art as the applicant.

Therefore, for these reasons and the reasons addressed in paragraph 14 above, the rejection of **Claims 1 and dependent claims 4-11** as anticipated under 35 U.S.C. 102(f) is maintained, and are further rejected as being anticipated under 35 U.S.C. 102(b) or obvious under 35 U.S.C. 103(a).

19. Applicant's arguments with respect to the rejection of **Claims 1-4, 6, 11-12 and 20 under 35 U.S.C. 102(b) as anticipated by Lepore**, have been considered but are moot in view of the new ground(s) of rejection.

Additionally, Applicant argues that the thermal film of Lepore is not suitable for use in an active antenna because it restricts heat passing into and out of the antenna reflector. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., heat transmission) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

The Examiner notes that Lepore specifically teaches that the thermal film serves to protect a spacecraft antenna structure "against thermal effects from sources of radiation such as the sun" *(Col 1, lines 8-11)*, and that other "prior art multilayer sunshields which disadvantageous because absorbed heat can become trapped among the several layers, and the temperature of the layers rises, and they produce infrared radiation which can impinge on the reflector, thereby causing the reflector to overheat" *(Col 1, lines 36-45)*, where the invention of Lepore cures the deficiencies of such prior art sunshields by satisfying various characteristics including low solar absorbance and high infrared emittance *(Col 3, lines 15-38)*. In response to the Applicant's argument that the interference filter of Lepore will "trap heat below the film leading to over-heating of the antenna", the Applicant does not claim this feature and as discussed above, Lepore specifically teaches that the thermal control film is designed to protect and prevent such communication antenna on spacecraft from overheating and malfunctioning. Thus the Examiner deems that the thermal control film of Lepore will not trap heat underneath the film, but instead will dissipate the heat through the multi-layered stack as described by Lepore as heat transfer from film to film occurs by radiation to individual fibers of the mats *(Col 7, lines 29-38)*.

In the newly made rejections above, the Examiner addresses Applicant's argument that Lepore does not teach a multi-layered film having high and low refractive index layers, where the Examiner points out that indeed Lepore does disclose a multi-layered structure where the polyimide, glass fiber, and quartz layers are considered to have high and low refractive indices that comprise the multi-layered film structure taught by Lepore.

Furthermore, the Examiner respectfully points out that as discussed above, Lepore specifically discloses use of a multi-layered thermal film on an antenna operating at 12-14 GHz *(Col 7, lines 50-52 and 65-68)*, and thus the film is used on an active antenna.

Therefore, in view of the above responses and newly made rejections, the Examiner considers Applicant's arguments moot and maintains the rejections of **Claims 1, 4, 6, and 11 under 35 U.S.C. 102(b) as anticipated by Lepore.**

20. Applicant's arguments with respect to the rejection of **Claims 1-2, 4, 6-7, and 12 under 35 U.S.C. 102(b) as anticipated by Iacovangelo**, have been considered but are moot in view of the new ground(s) of rejection.

Applicant agrees on the record that Iacovangelo teaches a multi-layer filter. However, Applicant's primary argument as that the multi-layer filter of Iacovangelo includes a solar reflective layer in the form of a metallic coating which does not allow for the transmission of RF signals and is not suitable for use in spacecraft antenna.

The Examiner respectfully disagrees, and as clearly outlined in paragraph 12 above, the Examiner considers the multi-layered modulated $SiO_2/SiO_xN_y/Si_3N_4$ radiative film taught by Iacovangelo to correspond to Applicant's claimed thermal control film comprising a multi-layer interference filter having alternating high and low refractive index layers made of the same materials as disclosed and claimed by Applicant. The Examiner agrees that Iacovangelo teaches deposition or arrangement of this multi-layer film on top of a metallic layer, however, the multi-layer film stack itself is free of metal and thus meets Applicant's claimed limitations.

Therefore, the Examiner maintains the rejection of **Claims 1, 4, and 6-7 under 35 U.S.C. 102(b) as anticipated by Iacovangelo**,

21. **Applicant's arguments with respect to claims 1-4, 6, 11-12, and 20 as unpatentable over Lepore in view of "3M Radiant Mirror Film", have been considered but are moot in view of the new ground(s) of rejection.**

Applicant first argues that the combination of Lepore and 3M fails to discloses every element of Applicant's claims, and that a *prima facie* case of obviousness has not been established.

The Examiner respectfully disagrees. As discussed above, Applicant admits on the record that commercially available films, such as those produced by 3M, can be adapted and modified for an active spacecraft antenna to have the desired bandwidth frequency characteristics.

Lepore discloses all of the properties that are desirable in thermal control films for spacecraft communications antennae. Lepore teaches a multi-layered structure with high and low refractive indices and bandwidth absorbency and emissive characteristics that meet Applicant's claimed limitations.

Therefore, the Examiner maintains that it is well within the level of ordinary skill to modify such commercially available films from 3M to have the desired bandwidth frequency characteristics as taught by Lepore as such characteristics are suitable for operating (active) spacecraft communication antennae.

22. **Applicant's arguments with respect claims 7 and 9-10 as unpatentable over Lepore in view of Iacovangelo, and claim 8 as unpatentable over Lepore in view of Iacovangelo and Fischell, have been considered but are moot in view of the new ground(s) of rejection.**

Applicant does not present any arguments regarding these rejections except that these claims depend from independent Claim 1. The Examiner maintains the rejection(s) of Claim 1, and thus maintains the rejection of claims 7-10. Applicant does not present any arguments except for that the claims depend from a distinguishable base claim. However, as discussed above, the Examiner maintains that both Lepore and Iacovangelo each teach a thermal control film that meets Applicant's limitations of Claim 1.

Therefore, the Examiner **maintains the rejection claims 7 and 9-10 as unpatentable over Lepore in view of Iacovangelo, and claim 8 as unpatentable over Lepore in view of Iacovangelo and Fischell.**

Conclusion

23. Any inquiry concerning this communication or earlier communications from the examiner should be directed to APRIL C. INYARD whose telephone number is (571) 270-1245. The examiner can normally be reached on Monday - Thursday 8:00 AM - 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David R. Sample can be reached on (571) 272-1376. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/David R. Sample/
Supervisory Patent Examiner, Art Unit 1794

APRIL C INYARD /A. C. I./
Examiner, Art Unit 1794